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June 30, 2003

Mr. Donald F. Capelle
Secretary of Health and Environment
Ministry of Health and Environment, R.M.I.
P.O. Box 1808
Majuro, Marshall Islands 96960

Dear Mr. Capelle,

The Centers for Disease Control and Prevention (CDC) is pleased to provide the Ministry of Health and Environment (MOHE) of the Republic of the Marshall Islands (RMI) a letter report on the "Comparison of Iodine-129 and Cesium-137 in Marshall Islands Soil." This letter report is the final part of a Cooperative Agreement (U50/CCU910802-06) between the RMI MOHE and CDC that began in 1994 when the RMI government asked CDC to study thyroid disease that may have resulted from exposure to radioactive fallout from U.S. atmospheric weapons tests in the Pacific during the 1940s and 1950s.

The original cooperative agreement, which expired on October 31, 1999, focused on the whether an epidemiologic study of thyroid disease could be conducted among Marshallese citizens who were exposed to radioactive fallout from U.S. nuclear weapons testing in the Marshall Islands. The protocol for this study was sent to the National Academy of Sciences (NAS) for peer review. The NAS recommended that CDC "Recalculate and document measured radiation levels" and "Justify the use of later Cs:I [cesium:iodine] ratios in soil" before conducting an epidemiologic study of thyroid disease. As a result of these recommendations and the expressed interest of the RMI government, a new cooperative agreement was established November 1, 1999. This cooperative agreement had two scientific aims in addressing the NAS recommendations; 1) develop quantitative methods to recalculate and estimate radiation levels from nuclear weapons fallout and 2) analyze soil from the Marshall Islands for iodine-129 to look at how it was deposited in the environment relative to cesium-137. This letter report discusses CDC's activities and conclusions in response to the NAS recommendations. Addressing these NAS recommendations also addresses questions related to the feasibility of performing a thyroid dose reconstruction from short-lived radioiodines (e.g., iodine-131, 8 day half-life) present in the radioactive fallout during the 1940s and 1950s but not detectable today in the Marshall Islands.

Project Overview in Addressing NAS Recommendations

Records identification and retrieval

CDC began this project by identifying and retrieving relevant documents from all potential record holdings related to the testing in the Pacific. This document database includes 29 boxes of documents the Department of Energy sent to the RMI and a complete CDROM database record of documents related to the RMI in the Coordination and Information Center (CIC) holdings in Las Vegas, NV.

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Conclusion: The quality and quantity of data exist to perform the scientific work called for in the Cooperative Agreement. [in response to NAS recommendation 1]

Methods development

CDC established and validated its study methods using data from the documents described above and methods similar to those used by the National Cancer Institute in estimating exposures to iodine-131 from fallout following nuclear weapons tests in Nevada. CDC reconstructed and analyzed patterns of cesium-137 deposits in the RMI from historical measurements and recent measurements of cesium-137 in RMI soil. The report of this work was sent to the RMI in September 2000.

Conclusion: These validated methods can be used to reconstruct scientifically credible estimates of ground-level radionuclide concentrations using data from historical documentation. [in response to NAS recommendation 1]

Iodine soil analysis

The RMI MOHE and CDC selected 67 soil samples from those stored in the RMI MOHE Radiation Study Laboratory and had them analyzed for iodine-129 using accelerator-based mass spectrometry at PRIME Laboratory at Purdue University. The samples represented soil from 11 Atoll locations and at 5 cm depth increments down to 30 cm.

The PRIME laboratory results of the iodine-129 analysis in soil are attached. In addition, CDC has compared the results of this analysis with the cesium-137 results from the Nationwide Radiological Study. Example charts from this comparison are attached.

Conclusion: Results of this comparison indicate that iodine-129 was deposited much like cesium-137, both in soil depth and distance from the Pacific test site. [in response to NAS recommendation 2]

Summary

Results of this study indicate that methods used to recalculate/reconstruct radiation levels are scientifically valid and that iodine-129 was deposited much like cesium-137, both in soil depth and distance from the Pacific test site. This information could be used to: 1) suggest that it is feasible to reconstruct thyroid doses from short-lived radioiodines (e.g., iodine-131) resulting from radioactive fallout in the Marshall Islands and 2) lend credibility to any dose reconstruction activities using similar reconstruction methods and cesium-137 measurements in soil to estimate thyroid dose/exposure from radioactive iodine. However, CDC does not at this time have the resources to conduct this work. We expect to publish the results of the work summarized in this letter in a scientific journal. Per our agreement, we are returning the unused soil to the radiation laboratory in Majuro. We are thankful for the opportunity to collaborate with the MOHE RMI in this important work. We would like to provide you with briefing on this project and will be contacting you to make arrangements to meet with you during one of your frequent business trips to Hawaii.

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Sincerely,

Robert C. Whitcomb, Jr.
Radiological Assessment Team Lead
Radiation Studies Branch
Division of Environmental Hazards and Health Effects
National Center for Environmental Health

Enclosure

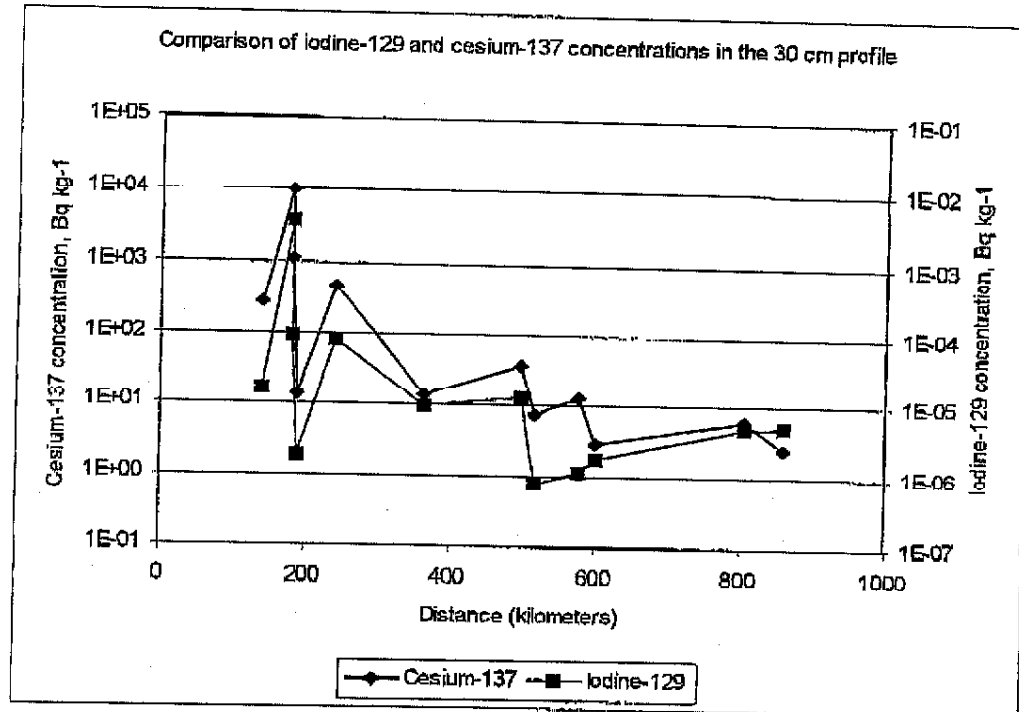
Cc (w/o enclosures)
U.S. Department of Energy
U.S. Department of Interior
U.S. Department of State
U.S. Public Health Service
Ms. Justina Langidrik, PI, RMI
Dr. Charles W. Miller, CDC
Mr. Phil Green, CDC
Mildred Garner, PGO

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Example results comparing iodine-129 and cesium-137 concentrations in soil with increasing distance from Bikini Atoll.

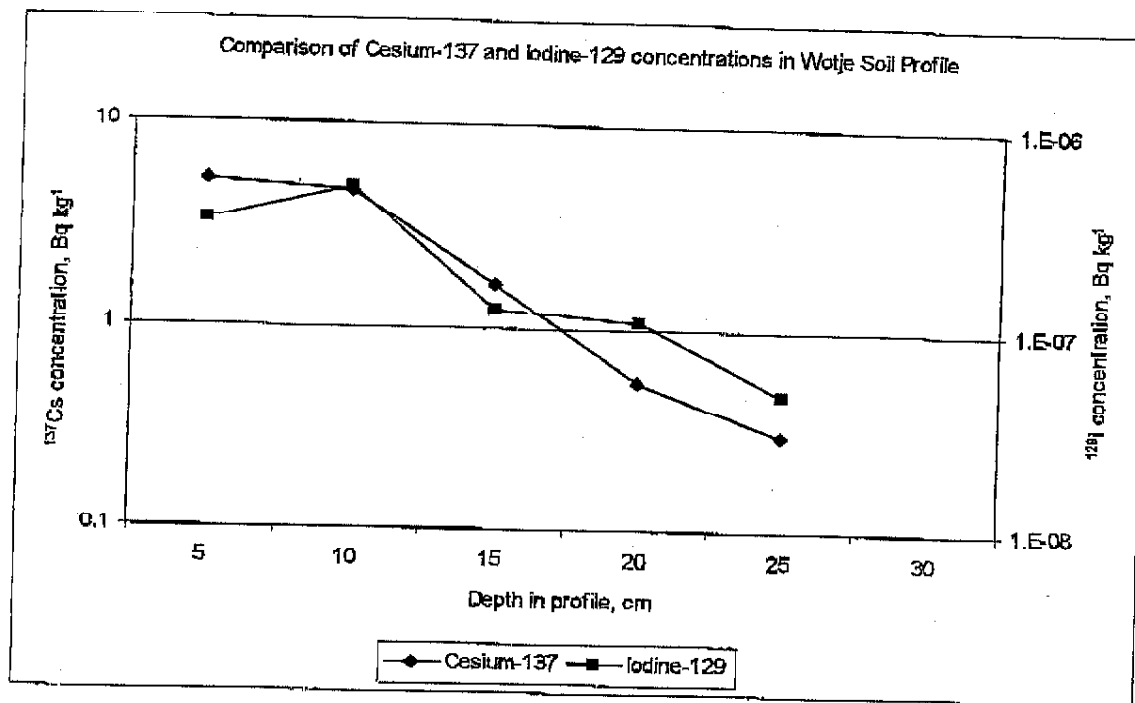
**Cesium-137 concentrations decrease as the distance from Bikini increases.
Iodine-129 concentrations also decrease as the distance from Bikini increases.**



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Example results comparing iodine-129 and cesium-137 concentrations in soil depth.
Cesium-137 concentrations decrease as the soil depth increases.
Iodine-129 concentrations also decrease as the soil depth increases.
This similar trend is found in other soil profiles.



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